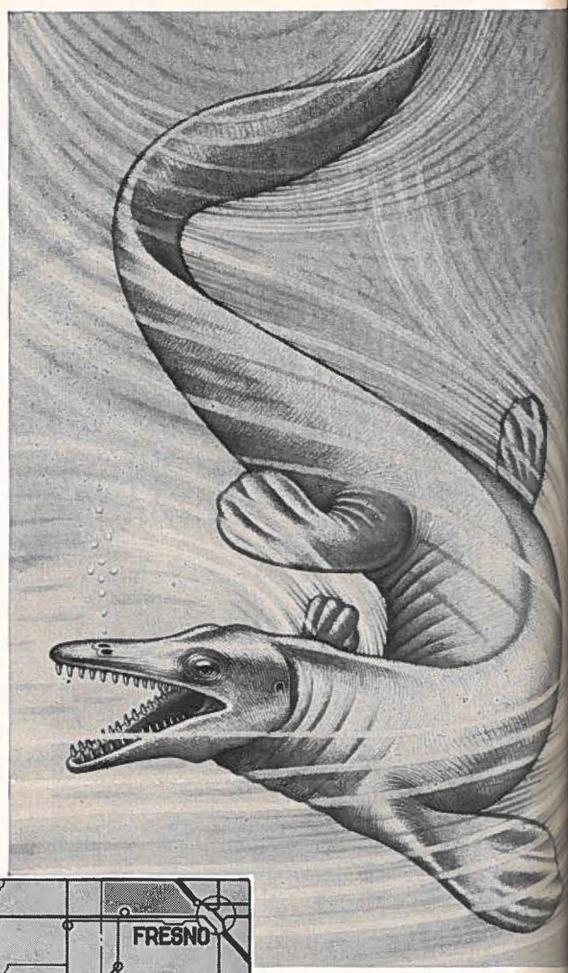
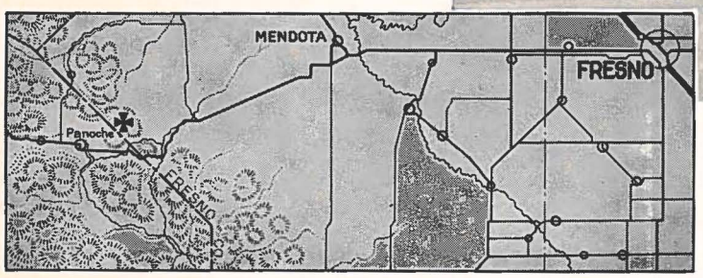
Left, a remarkable paleontological find, the head, vertebrae and other parts of a mosasaur or marine lizard. Note the series of small bones lying to the right of the upper end of the vertebrae. These represent remains of fish which had been devoured but not fully digested. Below, restoration by D. P. Willoughby, slightly modified after Williston



Ancient Sea Lizards of California

By CHESTER STOCK



Some of the striking fossil remains dating from the Age of Mammals that have come to light in the rock formations of California have been described from time to time in the pages of Westways. They show that western North America is singularly rich in those fossil remains which tell the story of the strange mammals that roamed the country during the past 50 or 60 million years.

But still earlier geological formations occur in California whence come fossil remains of more lowly vertebrated creatures than the warm-blooded mammals.

Immediately before the Age of Mammals in geologic history comes the Mesozoic or the great Age of Reptiles, a time when the dominant forms of animal life were the different kinds of reptiles including the dinosaurs. In the seas of this era there likewise lived a variety of reptiles adjusted in their several ways to an existence in salt water. During the later stages of the Age of Reptiles the sea several times transgressed the land along the Pacific Coast much farther to the east than it does today. The record of these submergences is left in the thousands of feet of accumulated sediments—shales, sandstones and conglomerates — which, since that time, were uplifted to form the rocks now exposed in the Coast Ranges, the mountains of southern California, and along the western flank of the Sierra Nevada.

Chance discovery of fossil reptilian remains in the Cretaceous (late Mesozoic) rocks, dating perhaps 100 million years back in time, focused attention upon formations of this geologic age in the middle Coast Ranges. A typical area can be seen along the eastern slopes of the Panoche Hills, northeast of Panoche Pass in western Fresno County. Search for fossils in this region revealed quite unexpectedly the presence of marine reptiles of a type distinctly different from those found in northern California.

Several of the better preserved specimens represent sea lizards with skulls nearly a yard long, whose bodies must have been 20 feet or more in length. In the structure of their skulls and skeletons these creatures show definite kinship to the lizards and snakes, but have adjusted themselves secondarily to life in the sea. They have been known from other parts of the world for a long time. A skull of one of these animals, now quite famous because of its eventful history, was collected near Maestricht, Belgium, and was described by the French naturalist Cuvier in 1808. Later this specimen was named *Mosasaurus,* from the Latin, meaning lizard of the Meuse. Mosasaurs have been discovered in New Zealand, South America, France, Russia and in North America. California is now added to this list.

The mosasaurs possessed long pointed heads with rather numerous conical-shaped teeth. The lower jaw operated in curious

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Contribution Number 307
Reprinted from Westways for January, 1941, Pages 21-22

fashion, for not only was it articulated with the skull at the back, as is typical in reptiles, but between the rear end and the middle of the mandible there was another joint which permitted the fore part to drop still farther down, giving added gape to the mouth. This mechanism and the somewhat recurved crowns of the teeth allowed the animal to catch and swallow slippery prey like fish, which were probably often of large size.

Their necks were short, their bodies long and somewhat eel-like. The front and hind limbs, which in lizards are characteristically fitted for locomotion on land, were modified in mosasaurs for swimming and were developed as paddles, with the front pair larger than the hind.

The fossil remains found in the Panoche Hills include not only the skulls and tails of these creatures, but in one instance a considerable portion of the body in front of the pelvis. An interesting feature of the latter specimen came to light when the skeleton was exposed. Lying partly within and definitely associated with the rib basket were fragments of the head and vertebrae of a large fish along with a mass of miscellaneous bone fragments which unquestionably represent undigested material from the intestinal tract. Thus the food habits of these reptiles as surmised from the structural characters of the skull and teeth receive an interesting confirmation.

In the light of the newly uncovered remains in California, we may conclude that the mosasaurs lived in coastal waters of moderate depth together with plants, marine invertebrates, fishes, and other kinds of reptiles. The latter included particularly the long-necked plesiosaurs as well as duck-billed dinosaurs. But the mosasaurs disappeared by the end of the Age of Reptiles, extinction overtaking them as it did the dinosaurs on the land, and for reasons that are still somewhat obscure.

Cretaceous reptile-bearing exposures in the Panoche Hills. The tiny dark spot in middle foreground marks the precise fossil locality

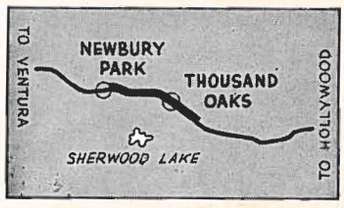
New Roads of the Month

For Safety's Sake

AS you read this, the finishing touches will have been put on a highly important piece of highway reconstruction.

Just beyond the Los Angeles-Ventura county line, Ventura Boulevard begins to wind preparatory to the climb over the Conejo Grade. The country there is beautiful, and familiar to motorists: typical California farm land, rolling hills with here and there an oak-tree or a group of farm buildings.

But the beauty of the country hides the dangers of the old road. Two particularly dangerous curves, one near the



Conejo Ranch house, the other just south of Newbury Park, have been the scenes of many accidents.

To do away with these danger-spots and save lives and limbs, these two curves have been eliminated by re-alignment and straightening of the route. The total length of the project is three miles, the total cost about $116,000.

On the Old Stage Road

THE road between Temecula and Warner's Hot Springs (State Highway 79) is interesting not only scenically but historically. It was down this route that the old Butterfield Stages rattled during the short but eventful life of that longest stage route in the world. Oak Grove was the site of a Butterfield station, and today is still the site of a public camp.

Just north of Oak Grove, a new bridge is to be built over Temecula Creek, and one mile of road is to be graded and oiled.

Argonauts' Path

NEVADA City is one of the most picturesque towns in all California. Its crooked streets, lined with buildings that date straight from Gold Rush days, are living reminders of that rowdy era in California's history. The attractive thing about Nevada City is that it remains pretty well intact. It is far from a ghost town, for although the mines are definitely played out, the activities of a full-fledged county seat give it a fair measure of prosperity.

Northwest of Nevada City, four miles of the Mother Lode Highway will be improved by widening and surfacing. The work is to be completed New Year's Eve.

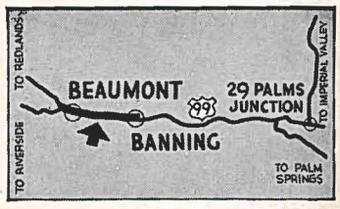
Headache Cure

PERHAPS the biggest highway news to Southern California motorists this month is the completion of six miles of magnificent four-lane divided highway on the Palm Springs route between Banning and the junction of U S Highway 70-99 (the Redlands route) with U S 60 (the Riverside fork).

The splendid new highway is the result of adding two new lanes to the existing two-lane road, the two pavement strips separated by a strip of earth from two to 30 feet wide.

It would be hard to name a highway route that means more to motorists, particularly winter tourists, than this sector of the Imperial Valley route. It carries thousands of sun-loving Southern Californians to and from the world's most famous desert playgrounds, and brings thousands of truckloads of Imperial Valley produce to the Los Angeles area. It carries its share of transcontinental travel via Blythe or Yuma. And for years the section west of Banning has been a headache to motorists returning from desert weekends, crawling along bumper to bumper over a road taxed far beyond capacity.

The headaches are now to be cured with four doses of highway medicine: (1) the new improvement already described; (2) a similar improvement to be completed next June between Banning and Palm Springs Junction; (3) modernization between the Jackrabbit Trail junction and Redlands; and (4) more of the same between Palm Springs Junction and Whitewater Creek.



Here and There

AMONG other highway projects to be completed during the month, these are of particular interest:

About two and a half miles north of Cloverdale, a short section of the Redwood Highway will be improved by grading and surfacing.

At Butte City, a bridge over the Sacramento River is to be removed, traffic being detoured across the river on ferries at Princeton or Ord Bend.

From Red Bluff six miles north on the Inland Route (US 99 West) six miles of highway are being graded and resurfaced.

On various sections of the Feather River Highway in Plumas and Butte counties, storm damages are to be repaired on four miles of the highway.